Technical Evaluation Report

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1.0 PURPOSE

The purpose of this summary of proceedings is to document the NATO Modelling & Simulation Group (NMSG) MSG-078 Workshop on Exploiting Commercial Games and Technology for Military Use.

2.0 OBJECTIVE OF THE WORKSHOP

The aim of the workshop is to explore through demonstrations and presentations the "hard questions" related to exploiting commercial games and technology in NATO. The objective of the workshop was to provide an opportunity for the Nations working the application of commercial technologies to provide a brief update on their ongoing efforts and to provide capability briefings on the state of commercial technologies with immediate potential to provide value add across one or more of the ACT's M&S Vision document application areas (defence planning, training, operations, capabilities development, and in particular SNOW LEOPARD). The objective was also to provide a common multi-national scenario for companies and organizations to participate in a distributed simulation plug-up, to provide a means for participation via teleconferencing or some other means for those not able to attend in person, and to allow ACT senior staff to observe and participate in the demonstrations.

3.0 WORKSHOP AGENDA

Tuesday 22 Sep 2009

0845 – Welcome
0900 – Opening Remarks
0945 – "A Future for Simulation"
1040 – "Games for Training? Surely You Can't Be Serious!"
1120 – "VBS2 in 2010"
1310 – "Tactical Language and Culture language Training Systems"
1350 – "Joint Operating Environment (JOE) Second Life Virtual World Development"
1430 – "Beyond the Game – Embedded Training Cultures"
1530 – "GaMeTT"
1610 – "NATO MSG-078 Plugup: The Story Behind My Failure"

Wednesday 23 Sep 2009

0845 – Day 1 Recap
0900 – "What's Changing: My Perceptions and History of Simulations"

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14. ABSTRACT
The purpose of this summary of proceedings is to document the NATO Modelling & Simulation Group (NMSG) MSG-078 Workshop on Exploiting Commercial Games and Technology for Military Use.

15. SUBJECT TERMS

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0940 – "UK MOD Serious Games Research – Looking to the Future"
1040 – "Commercial Gaming in the Canadian Forces"
1120 – "Dangerous Waters"
1310 – "NATO VBS2"
1350 – "Breakaway Demonstration"
1430 – "JCATS with a Virtual Desktop"
1530 – "VBS2 Modules"
1610 – "Multi-level, Multi-Resolution Gaming"
1640 – "Damage Control Demonstration"
1700 – Day 2 Recap

Thursday 24 Sep 2009

0900 – "Energy Gaming and Governance Impact of Tangibles and Intangibles"
0940 – Open Panel Discussion
1130 – Workshop Wrap Up

4.0 PARTICIPANTS

Dr Adrian Gheorghe	Johannes Denijs	Capt Enrico Bonatesta
Stu Armstrong	Wayne Buck	Jim Flaherty
Glen Bethel	Maj Gary Evans	Jim Carr
Mark Phillips	Marcus Dahlberg	Jan Ward
Jackie Scolaro	MG Skare	Staffan Granberg
Daniel Scolaro	Nico Bau	Robert Virding
Matt Spruill	Roger Schane	LTC Vincenzo Calicchio
LTC Chris Hall	Roy McNee	LTC Jan Beaumont
David Fliesen	Johannes Denijs	Major Jeremy MacDonald
Pete Schrider	LTC Christian Bell	Clark Rich
Patrick Samama	LTC Eriks Naglis	David Unrau
Mike Gracewood	Maj Richard Nowinski	Curtiss Murphy
Jennifer McNamara	LTC JP Cormier	Dan Henkel
Garth Jensen	LTC Istvan Ocskay	Colin Bigg
Peter Morrison	Murray Taylor	Jacek Sumislawski
Stacy Elliott	Eric Pouliquen	Walter Hader
Michael Emonts	CAPT Carlos Alberto Belinchon Pinedo	Maj Kuido Pettai
Julien Mallet	Gianluca De Leo	Jens Malmquist
Amy Grom	Col Andrea Solymar	Geoff Johnston
Doug Whatley	Dan Berry	LTC Mike Patchett
Bharat Patel	RADM Christian Canova	Maj Geoff Smith
Andrew Brown	Nathan Carreiro	Joe Armstrong
MSGT Cleon Skeete	Jaymie Caplen	

5.0 EXECUTIVE SUMMARY OF PRESENTATIONS

5.1 Opening remarks by RAdm Christian Canova and Dr. Eric Pouliquen, ACT

RAdm Canova formally opened the conference with a context presentation that explained the relationships of NATO and ACT, and how the Research and Technology Organization (RTO) fits into the organization. RAdm Canova explained that NATO ACT's mission is to be NATO's leading agent for change, driving, facilitating and advocating continuous capability improvements in order to enhance the military effectiveness and relevance of the Alliance. He also diagramed the relationship of the NATO M&S Stakeholder organizations into the requirements organizations grouped into ACT and ACO, wrapped by the support and coordination M&S stakeholders such as NC3A, then those in a consultation role such as academia, industry, and the partner nations. RAdm Canova explained the NATO R&T Organization (RTO) and its mission to conduct and promote co-operative defense research and information exchange within NATO and its partners. He explained that the RTB assigns work issues to one of seven groups within the organization that all of the partner nations have representation within. This conference, MSG-078, fits in under the Modelling and Simulation Group. RAdm Canova concluded with recognizing the need to incorporate the M&S technological advances to develop NATO capabilities, and envisaged plenty of potential, not only in the military-purpose built, but also in non-military commercial technologies and applications, such as computer gaming (serious games), collaborative work environments and social networking technologies (virtual worlds).

RAdm Canova was followed by Dr. Eric Pouliquen who focused his brief on how the MSG-078 fits into ACT and its vision. His organization, the R&T Coordination Branch, is to influence and contribute to efforts in the NATO R&T community, exploit the outputs from the R&T community, industry and academia for ACT capability development, and to lead/support capability development projects/studies such as Snow Leopard. Their current priorities are implementation of the Framework for Collaborative Interaction (FFCI) and implementation of an M&S vision. The ACT M&S Vision is ACT exploits modelling and simulation to support NATO transformation wherever it can enhance capability, increase interoperability, save resources or reduce risk in the application areas of training, operations, defence planning and capability development. Dr. Pouliquen explained how the Application Areas of M&S (Defence Planning, Operations, Training, and Capability Development) relate to the Cross-Application M&S Objectives (M&S Policy, Education, Coordination and Outreach; M&S Interoperability and reuse; M&S Common Services; Develop and Employ M&S Federations; Incorporate M&S Technical Advances) to meet the goals of enhanced capability, increased interoperability, saving resources, and reducing risk. Current work includes: technology watch, standards, outreach, models, distribution systems, and best practices.

5.2 A Future for Simulation by Doug Whatley, BreakAway Ltd.

Mr. Doug Whatley, CEO BreakAway Games, offered his vision as a future for simulation and stated that his purpose was to set the tone for the conference. His vision is "A simulation for everyone for every purpose." His premise is that in the future people will use simulation as part of their normal daily life – to think about new concepts, plan their day, study plans, and many other normal uses. As background he used an example of the Soap Factory manager that asked his staff some hard questions. In return he received answers but not the answer to his question. What was really needed was a sandbox for the manager to "play" with his ideas. Thus, when Mr. Whatley states a simulation for everyone, he means that normal people can use tools to answer their questions, tools that make all tasks simpler and more efficient, and being able to understand 2nd and 3rd order effects of decisions. In order to explore this vision, Mr. Whatley introduced the topic of organizational change. He used the typing pool vignette to discuss how organizations changed with changing technology and that the typing pool was necessary but more efficiency and quality of work drove the need for

systems to allow the "creative class." The creative class is defined as those individuals which engage in complex problem solving that involves a great deal of independent judgment and requires high levels of education or human capital. Mr. Whatley posed a series of thought provoking questions on whether or not the current developers of technology as well as the organizations are satisfying the needs of the creative class to further their individual causes or passions. He then asked if the developers of technology, and in particular simulations/games, are meeting the needs of the creative class or are they holding them back. The real question he posed to the group was whether or not we were building simulations and organizations that won't exist next year much like the typing pool. Mr. Whatley then gave a few examples of simulations for everyone such as the GPS and cleaning robots. He concluded with asking the group to identify the creative class in NATO and what will be there simulations needs.

5.3 Games for Training? Surely You Can't Be Serious! By Mark Phillips, MASA Group

Mr. Mark Phillips began his presentation with an overview of MASA Group and the company's three main areas of focus: cognitive AI, machine leaning, and optimization. He then provided a tutorial on the differences of games and simulations. He clearly stated that all games are simulations but not all simulations are games. He also espoused that as games move closer to the M&S community, they must pay particular attention to validation and verification, a lesson that MASA Group has learned by a requirement to validate 2000 behaviors for the SCIPIO program. Mr. Phillips provided a survey of what's new in the M&S community from a trend basis. He stated that more and more games and game technologies are being accepted as equal or superior to existing, large training systems or simulations; that governments are taking a hard look at overall costs and are adapting their procurement processes to gain efficiencies while still providing adequate training; and that long term development cycles greater than twelve months are simply not acceptable. He then articulated the current state and provided an argument for the use of middleware in the M&S/games industry. With speed to market in imperative, and the need to reduce the risk of system development as quick turn product lifecycles, middleware is proving to be the enabler allowing the gaming industry success. He provided a host of examples for all aspects of gaming technology development where middleware is being successfully utilized. On where we as a community are headed, Mr. Phillips believes that the pendulum is swinging from the adoption of game titles as training devices to the adoption of game middleware, motion tools, path engines, sound engines, etc will be brought together in compelling ways to build new devices.

5.4 VBS2 in 2010 by Pete Morrison, Bohemia Interactive Simulation

Mr. Pete Morrison provided a history of VBS2, the current efforts BIS is developing for VBS2, and a technology roadmap for the future of VBS2. Mr. Morrison stated the initial requirements of VBS were tactical training and mission rehearsal, combined arms training, a high fidelity environment through graphics, and an extendable system. He also stated the VBS has morphed from a pure game to more of a simulation because end users demanded scenario authoring and runtime authoring, the need for an AAR system, interoperability, and rapid terrain development. Bohemia's current efforts with VBS2 version 1.3 include: adding equipment to current kits such as fording equipment, adding additional ISR capabilities, adding robots, conducting casualty evacuation, helicopter rotor wash, shattering of HMMWV windows, the ability to create forms, and the introduction of middleware, as well as a complete developer suite of tools. Bohemia's effort with the US Army is to build 20 scenarios off the shelf as well as a VBS2 lite. Within the FITE JCTD, they are working on cultural gestures, glint for optics, realistic variation of character sizing (thin vs heavier weight people), and expanded AAR capabilities. In the VBS2 version 1.4, BIS's roadmap includes amphibious operations, improved vehicle and unit damage modeling, climbing ladders, in-game terrain editing, and situational awareness improvements. Their mission rehearsal roadmap includes Falcon View integration, first

person combat enhancements, and helicopter flight model fixes such as fast roping and landing. BIS has a plan to accomplish streaming terrain to meet the US Army large playbox requirements. They will accomplish this in three phases. On his wishlist is an image generation capability combing streaming terrain plus robust AI plus mutli-channel imaging, improved procedural terrain generation, and improved armor simulations.

5.5 Tactical Language and Culture language Training Systems by Micheal Emonts, Alelo TLT, LLC.

Mr. Micheal Emonts provided an overview of Alelo TLT, LLC and its products. Alelo's mission is, "Our revolutionary software solutions produce effective inter-personal communicators across languages and cultures worldwide." Mr. Emonts provided an overview of Alelo's history, awards, current company demographics and the value of operating in Los Angeles, California. Their key features of their products are: learner relevant tasks and missions, virtual world environments, continuous feedback, success (in context) is immediately evident, and engaging and entertaining. These features lead to motivation and motivation leads to increased training effectiveness and increased time-on-task. Alelo's current products include: Dari, Pashto, Iraqi, French, and Indonesian Tactical Language and Culture Systems (TLCTS) along with their IPod and IPhone companions; Virtual Cultural Awareness Trainer: Horn of Africa; Virtual Role Players (VRP): VBS2; GoEnglish: China and Iran; Unit Training Manager; and Operational Language and Culture Training System (OLCTS). Emerging technologies from Alelo include: Integrated System for Language Education and Training (ISLET), SocialSim-MR, and HSCB CultureCom.

5.6 Joint Operating Environment (JOE) Second Life Virtual World Development by David Fliesen, Sonalysts, Inc.

Mr. David Fliesen provided an in depth overview and demonstration of JFCOM's work in developing a virtual world. The U.S. Joint Forces Command's Joint Futures Group (J-59) is developing a Community of Interest (COI) inside the virtual world Second Life to educate, collaborate, and harmonize the Joint Operating Environment (JOE) with Non-Government Organizations (NGOs), International Organizations, and other communities. Their virtual world work includes: the JOE GeoDome, trends and context, a Sun Tsu Virtual Guide, and virtual world open solutions. GeoDome was created to further the messages and research of the JOE. The GeoDome displays the trends and contexts mentioned in the JOE. The Virtual Guide: Sun Tsu is an artificially intelligent avatar that is realistic to visitors to the GeoDome in chat sessions. The Open Virtual Collaboration Environment (OpenVCE) offers free buildings, landscaping, and textures for collaborative facilities in virtual worlds. Included in the open platform are: social networking, Drupal based content management system, and Second Life/Opensim virtual world platforms.

5.7 Beyond the Game – Embedded Training Cultures by Glen Bethel, Australian Army

Mr. Glen Bethel provided an overview of the history, perceptions and future plans of the Australian Army in the use of games and gaming technologies. The Australian Army adopted VBS1 based on the initiative of a few key military personnel. It was seen as a leap of faith and met resistance by traditional "training experts." Australia pushed forward with the project, and with the introduction of related products such as Steel Beasts Professional and Tactical Iraqi TacOps, a culture change began with the slow improving and understanding of the word, "game." During the development of VBS2 and Steel Beasts Professional (SBPro), the Australian Army began embedding the technologies into the classroom cultures. The schoolhouses became more adept, the warfighters more accepting, and a change had occurred. The current uses of VBS2 include: mission specific training, explosive hazard awareness and protection, convoy operations, aircrewman training, area of operations familiarization, and adhoc user initiatives. Current uses of SBPro include: Tactical Exercises

Without Troops (TEWTS), desktop gunnery, and combat officer collective training. Other tools used are tactical language during force preparation and Decisive Action for the Staff College. Current initiative and projects include: the Universal Training Terrain Project, support to fire control in VBS2 where they will useVBS2 as a step in the certification process, integration into other facilities and projects, wider dissemination throughout the ADF suing VBS2 Lite, support to capability development projects, replacement of ageing engines, integration into procedural trainers, integration into SAFs such as OneSAF and JSAF, and Classroom 21with simulation on the desktops. Australian industry initiatives include: Project Canary where the Queensland Mining Skills is using VBS2 for workshop management and awareness, and non-military applications that have direct military use. Key issues that Australia is currently dealing with are perceptions beyond the game, and the question of what level of fidelity is good enough; and that the games must be able to scale. In order to overcome a multitude of issues, Australia is developing a series of key documents including training management plans, simulation user guides, instructor handbooks, commander's guides, and an Army Simulation Strategy. Opportunities presented (but more an analysis of trends) are: need for strategic reform and cost cutting with the tightening of fiscal policies, efficiency and effectiveness reviews are occurring, they realize a need to train in a coalition environment, and senior leadership finally "gets it." In summary, game technologies are here to stay, we as a gaming and game technology community need to learn from each other, we need to maximize the opportunities to exchange information, and we need to provide structure and design to the application of the tools instead of just playing the game.

5.8 GaMeTT by Pete Schrider, MYMIC

Mr. Pete Schrider provided an overview of virtual worlds, a description of MYMIC's GaMeTT product and a partial demonstration of the product. During his overview, Mr. Schrider defined virtual worlds, provided concrete attributes of virtual worlds as defined by IARPA, discussed the graphical landscape, and discussed the key component – the avatar. He then described the GaMeTT product which is based on Forterra, Inc's On-line Interactive Virtual Environment (OLIVE) product where the goal is improved team performance of an operational task. The first use case is medical team training. Potential applications include rapid emergency response, counter narcotics/counter terror, National Guard response teams, and personnel evacuation to name a few. GaMeTT allows teams to train together online in a 3d environment under simulated realistic conditions including movement through the environment, interacting with other team members and patients, working with mission or organizational specific equipment, performing positional duties, and a method to retrain tasks. With GaMeTT, the user (or instructor) can easily configure the scenario by choosing from a library of scenarios, reconfiguring the environment, setting difficulty switches, injecting events into the scenario in real time, and configuring data collection to support the AAR. The value to the trainee is they can with a team from any location, learn and practice procedures, evaluate alternative CONOPS, and it allows mistakes in a forgiving environment. Current development includes: an Inventory Manager plug-in and GUI, Scenario Manger/Flow Control GUI and a scenario editor.

5.9 NATO MSG-078 Plugup: The Story Behind My Failure by Jenn McNamara, BreakAway Ltd.

Mrs. Jenn McNamara provided an overview of her effort to bring mosbe, a BreakAway product to the intended MSG-078 Plug-up. At the conclusion of her briefing she led a discussion with the group of issues that the group must face in order to achieve an actual plug-up in the future. BreakAway had intended to bring mosbe as their contribution to the plug-up. Mosbe offers exercise support for up to 32 players over a LAN with integrated AAR capability and white cell command capability. It contains over 600 military and civilian vehicles, 200 sensor systems, and 150 weapon systems and it is optimized to support up to 2500 units. Mosbe has a wide range of application including training and rehearsal, end user simulation control, an experimental

sand box, new concept visualization, and it can connect disparate simulations. Mrs. McNamara detailed the chronology of her effort with the RTO, ACT, and NATO staffs from MSG-074 until arriving at MSG-078. She then made recommendations on how we can actually succeed at achieving a plug-up. During the Planning Stage, she recommends that we hold a planning session and address federations (one or more), simulation world definition including location and size, the scenario, which assets, the FOM and RTI, exchange technical points of contact from each organization, and any limitations on data usage. During the Preparation Stage, an authority must provide the terrain data, FOM and key attributes, scenario parameters, and conduct coordination teleconferences. During Execution Stage, a dedicated secure room with time to setup and test the federation must be provided, then plan to demo the whole federation then allow each participant to explain their role while still in the federation. Other issues offered up during the discussion at the end included: determining the training case (why do a plug-up), who will provide RTI licenses and how, focus should be on COTS and exploring the technologies, terrain representation such as round earth or flat earth, behavior differences, and determining the reasons for conducting the plug-up such as technology refresh issues or adding to the current federation to provide options.

5.10 What's Changing: My Perceptions and History of Simulations by Matt Spruill, SAIC

Mr. Matt Spruill provided the scene setting briefing for day two of the conference. His stated purpose was to provide the audience his perceptions on what is changing in the modeling and simulation world today. In order to do so, he provided his personal account of his experience with simulations, and then presented an analysis of where the market is heading and why. Mr. Spruill discussed his experiences throughout his military career starting with ARTBASS. He did not have a good experience, not because of the simulation, but because of the use of the simulation and the design of the exercise. Later in his career, he was introduced to the Joint Theater level Simulation (JTLS) which met most of his unit's training requirement, but they were forced to federate other simulations in order to meet their needs and the federating of the simulations was at a high price. Mr. Spruill then provided a history on the development of the all service entity based federation, the Joint Live Virtual Constructive (JLVC) Federation. The JLVC is a great federation but it too comes with a price. The history lesson was the scene setter for the analysis. Mr. Spruill has observed that single simulations have not met the need, thereby resulting in the federating of simulations as we have seen in the last 8 years. But, he is currently observing a dramatic decrease in the demand for large simulations and a move to more efficient, leaner, light weight solutions. He surmised that this trend is due to economics, a desire by the community to reduce duplication, the collaboration that is occurring between users and developers of simulations, and that the culture of the users is changing. He also suggested that emerging ideas such as lightweight desktop simulations, smaller bite sized training scenarios, the use of advanced distributed learning, gaming, and virtual worlds are beginning to flourish. Given that the new technologies are present, Mr. Spruill concluded that our community must accomplish two tasks in order to further advance the use of these emerging concepts: determine the training case for the technologies instead of just displaying them to users, and change the mindset of the policy makers.

5.11 UK MOD Serious Games Research – Looking to the Future by Stu Armstrong, QinetiQ

Mr. Stu Armstrong provided a presentation on the background of the UK MOD's work in serious gaming, their current projects, and a snapshot into the future. The UK MOD identified serious games as a key area for exploration. The COTSEU was established to act as the focal point of the research with the mission of providing advice to the UK MOD, liaise between developers and users, and to provide capability demonstrations. While the UK has explored and is utilizing a variety of serious games, three topic areas are currently in work: the IED Situational Awareness Tool, aviation tactics training, and helicopter brown out. All three support training for current operations. Mr. Armstrong presented his view of the technology

roadmaps for network technology, terrain generation, input methods, and simulation. Over the next ten years, he predicts that we will have super fast network access anywhere, anytime; fully automated terrain generation of whole-world from multiple sources; input sources will be from emotion recognition, eye movements, thoughts, and haptic devices; and simulations will have common model and terrain formats with single visualization. He concluded with an example future command and control vignette using a recent fourteen year olds campaign plan and execution in a MMOG called "Eve On Line."

5.12 Commercial Gaming in the Canadian Forces by MAJ Jeremy MacDonald

MAJ MacDonald provided an overview of his organization, their current projects and future work. His primary mission is to develop capabilities and recon for what is available in the community. One key aspect of his organization is that he is using college interns to support his work. Recent completed projects include Direct Action, Federiction Core, and 3D Model Exchange. Current projects include IRET, WIC/Federiction expansion, Turret Sim, and Parachute Sim. The Immersive Reflexive Engagement Trainer is a capability that incorporates video games, but still allows soldiers to "kick in the door." This capability is an immersive trainer that posts video imagery on walls. It also uses motion capture, feedback vests, simulated flashbang grenades, speech recognition and they are exploring the use of firing rounds through walls. The WIC Federiction project is intended to support call for fire training for the Combat Team Commander's Course where they course currently conducts the training in an urban area through TEWTs. The purpose of the Turret Sim is to develop a LAV-25 training turret for gunnery training without having to rely on having a vehicle present as used in the existing system. The system is a mock up of the turret using VBS2 as the engine, and replicating the controls. His future work includes Augmented Reality to blend real world and virtual worlds together, the Microsoft Surface Table to train commanders on tactics and organic motion for full motion capture.

5.13 Dangerous Waters by Mike Gracewood, CFMWC

Mr. Mike Gracewood presented a program brief on Dangerous Waters, a serious games use at the Canadian Forces Maritime Warfare Centre. The project goals were to improve the capability to conduct littoral operations, demonstrate effective application of air platform resources, and to explore the impact of M&S technology to tactics and doctrine issues. Tools used for the project included JSAF-HFF, Dangerous Waters, and the Data Management Tool (DMT). Current activity includes an assessment for verification and validation purposes by the CFMWC and evaluation for training within the 12/14 Air Wing. Future work will include completing the evaluations, providing configuration management for the users, integrating compatible tools sets, and model improvements. Valuable lessons learned and observations have been made throughout the project. One of the key lessons learned is that acceptance of a game in a military environment has been very difficult. While V&V is the responsibility of the developer, the onus of accreditation is on the user which means that the user must accept the game, and then accept changes/modifications to the game. For configuration management, CFMWC provides sites licenses (10 per site), accepts changes requests and manages the changes centrally. Finally, a key comment was that for proprietary software, the government agency must determine in the lifecycle how much code you have access to during a project.

5.14 NATO VBS2 by Lt Col Chris Hall, ACT

Lt Col Chris Hall presented NATO's current VBS2 project to provide an advanced distributed tactical training tool for C-IED Force Protection training to supplement ADL courses. NATO VBS2 is a version of VBS2 and this project fits into the Simulation Advanced Distributed Learning project under Snow Leopard. This project is in direct response to a C-IED training identified deficiency amongst the nations. NATO will provide clients

with pre-loaded C-IED training content including the Insurgent Mindset Training developed for the USMC, a train the trainer course, and C-IED multi-player scenarios. The intent for use at the JWC and JFTC is for NATO VBS2 to provide visualization for other constructive simulations, support the creation of enhanced presentations, reuse scenarios built in the school houses, and provide a free platform for experimentation. NATO will provide the clients, the VBS2 VTK at a reduced cost, access to the NATO servers on a time share basis, and a moderated portal. Services will be established by December 2009. Identified issues that could cause problems include: maturity of the concept, a paradigm change required, availability of content, security, accreditation, resources, national POCs, and identifying a configuration management POC.

5.16 Breakaway Demonstration by Jenn McNamara, Breakaway, Ltd.

Mrs. Jenn McNamara provided a company overview of Breakaway, Ltd and product demonstrations/overview of their products. In the company overview, Mrs. McNamara surmised that game base technology is much more than just the shooters, defense customers are searching for different things. Products demonstrated included the Expeditionary Airbase Sim (EAS) used to teach people how to set up an expeditionary airfield, mosbe used as a mission planning simulation with integrated after action review, scene builders and is HLA compliant, Incident Command used to train local and individual first responders on the National Incident Management Protocol (NIMS), Vox Populi which trains the strategic planning process and effects of actions, PULSE and Virtual Dental Implant Trainer both focused on health care.

5.17 JCATS with a Virtual Desktop by Amy Grom, JFCOM

Mrs. Army Grom provided two demonstrations of current JFCOM capabilities. The first was a Joint Theater Level Simulation (JTLS) / Joint Conflict and Tactical Simulation (JCATS) / VBS2 federation demo and brief. Mrs. Grom also tied it in with current NATO Training Federation capabilities. The vignette utilized to demo the project was a time sensitive target (TST) vignette. The second demo was a DI Guy and JCATS federation using Distributed Interactive Simulation (DIS). The federation uses the VMASC insurgency model work as well.

5.18 VBS2 Modules by Peter Morrison, Bohemia Interactive Simulation

Mr. Peter Morrison presented his vision and company's plans to provide a more robust, easier method to access the VBS2 engine in the future. He began by describing the VBS2 VTK components. He discussed the Application Scripting Interface (ASI) and that it allows developers access to over 1300 commands in the VBS2 source code and allows for the creation of VBS2 plug-ins. However, in order to capitalize on the API, a developer needs to know the 1300 script commands. His solution to this problem is the creation of the VBS2Fusion API that provides functions, can be up to 200 times as fast, and requires no knowledge of VBS2 scripting. He is doing this because it fits into his company's long term goal of converting core engine capability to lightweight, customizable modules that can be portable across game engines and platforms. He is setting up for establishment of a standard API that the industry can work towards.

5.19 Multi-level, Multi-Resolution Gaming by Julian Mallett, MAK

Mr. Julian Mallett presented the case for multi-level, multi-resolution gaming. He revisited history and reminded us that there was a time when people stated that games could not be serious. He also reminded us that "team play wins." Mr. Mallett stated that while games are an essential part of the solution, they don't model the entire process thus integration of multi-level, mutli-resolution games and simulations are necessary to train the essentials of command, control and communications. MAK's objective is to provide an

environment to explore current and future combat operations, sharpen decision making skills, and broaden experiential skills. MAK's experience in the gaming world through their products include: Spearhead, Game Link, BC-2010, DARWARS training package, and Quickstrike. He concluded with detailed descriptions of the concepts of multi-resolution modeling, ownership transfer, and systems of systems architecture; and then explained their relevance towards end-to-end decision making skills training.

5.20 Damage Control Demonstration by Curtis Murphy, AlionScience

Mr. Curtis Murphy provided a demonstration of the Damage Control game developed by AlionScience for the Office of Naval Research (ONR). The goal of the project was to build a game that improved new recruit training. The intent of the game is to allow students, many of which have never been on a ship, to be in the environment and learn as they go, making mistakes prior to boarding a ship. Key to the process was real-time assessment of progress and feedback to the student. He concluded with a demo of the game.

5.21 Energy Gaming and Governance Impact of Tangibles and Intangibles for DMP by Dr. Adrian Gheorhe, Old Dominion University

Dr. Gheorghe presented a demonstration of an online game focused on energy independence decision making. His premise is that countries want to be energy dependent and in order to do so must be able to train to make the right energy mix decisions. His game is web-based and has four components: Primary Mix Issues, Security Issues, Resilience Issues, and Health & Environment Issues. Primary Mix allows the player to look at options for different energy solutions. Security allows the player to assess the vulnerability of energy assets. Resilience displays results of a system's resiliency to recover from disastrous events under differing conditions. Health & Environment display environmental effects of pollution.

6.0 PANEL DISCUSSION

A panel discussion without presentations was formed during the conference to allow open discussion of topics and ideas. While the discussion was formed around several topics, as expected, there was a great deal of divergence from the main issues and topical discussion amongst the group. Generally, it started with a discussion of business models that lead to a discussion of exploiting technology which lead to a discussion of large vs small businesses. Below represents the main topics with their associated comments from the group. Some of the comments are statements, some questions, and some pure opinions. Specific names are generally not associated with the comments in order to facilitate and encourage discussion at future conferences except when the question or comment specifically addresses an organization or company.

6.1 Topic: Business Models to leverage Serious Games

General comments:

- Those that want to build their own games go GOTS.
- In the UK, there are two general means for COTS solutions. However, the procurement personnel must be convinced that the risk is low:
    - Under the wire, meaning outside the normal acquisition process where speed and agility are required.
    - When there are no formal, written requirements.
- Large programs, when training is a small part of the overall program, cannot risk going with a small company because of the risk to the overall program.

- One of the key issues with screening a small business out of the competition for an opportunity is that a small business may not be around next year and this increases the risk.
- Most innovation and research is done on a companies own nickel.

6.2 Topic: Exploiting Technology

- Question: Are you (governments) really here at the conference to try and exploit commercial games and what are you going to do about it?
- Follow up questions: What are the mechanisms if you are going to exploit commercial technology? The US has a BAA process, but how does NATO do it? What is the business model?
    - The UK MOD has the Defense Industrial Strategy that outlines the process. Basically it reduces primes to a manageable level. Small companies should partner / sell their products with primes. Bottomline, we want to deal with small companies as well.
    - The UK is attempting to develop relationships with small and medium companies. Primes don't innovate enough and in order for the UK MOD to bring in innovation, they are starting the Synthetic Technologies Tower project.
    - The UK is not looking at specific systems, they are seeking key technologies. Therefore, unsolicited proposals are acceptable.
    - In NATO, the reason for this workshop is to share info on these technologies in order to share and display the technologies to the NATO nations but integration of the technologies is largely through the primes.
    - One thought is to develop a collaborative environment for development. Authors comment: Such as a Cooperative Research and Development Agreement (CRADA).
    - Exploiting is about finding new technologies and ideas.
    - Question: Do we really expect to exploit commercial technologies?
        - Yes
        - One way to exploit is to be disruptive.
    - Question: What is exploiting and how is it going to occur?
        - Exploiting of technologies will and must occur in the nations, NATO just provides the mechanism to see it through conferences such as MSG-078.
        - An example of exploiting a technology is the "Training of Individual Augmentees for Deployed Staffs Using Virtual Worlds" experiment that ACT is involved in with JFCOM and two companies, one large and one small.
        - Exploiting in NATO is difficult. However, methods to do so include:
            - Being disruptive and finding a champion in the government.
            - Subverting the acquisition process and getting directly to the users – that's disruptive and they become your champions.
        - One thing that must be considered is how much and how to accomplish deploying a system on the unclassified and classified networks.

6.3 Topic: Myths of Serious Games Companies and Primes vs Vendors

- Perception: The perception that serious games companies are building games and repurposing them for defense use is a myth.
    - If a company is not generating revenue from somewhere else, such as the entertainment games market, then they are just defense contractors and not a games vendor.

- Question: is there pressure for the game companies to become a defense contractor vice a vendor of games?
  - Yes, from both sides.
- Serious games vendors that focus on defense stay in the games business for innovation and to develop new technologies.
- We (the government) expect that this is happening and want to leverage the new technologies because the governments like COTS to stay pace with new technologies.
- Games vendors are leveraging technologies but not repurposing specific games.
- Question: Is there any advantage to entertainment games companies to have endorsements for their serious games by governments?
  - No, not in the entertainment industry. Most entertainment games companies are not interested in the defense market, thee simply isn't the money in the market like the entertainment market.
- Some small business started with the model of targeting their products for the primes but found out that the primes don't want them to grow, they want them to stay small.
- The strength of a game company is the speed of advances in technology or its products. The key is a high level API specification where the large primes can use the small company products through the APIs.
- We, the primes, are the way we are because you (the government) made it that way. You want low risk, large companies that can offer affordable solutions.
- Don't forget about academia, they have a stake in this problem too.

6.4 Topic: VV&A and Feedback

- Verification, Validation and Accreditation
  - Question: Is it VV&A or is it Quality Assurance?
    - One comment from a small business games vendor – they would rather go thru the Army VV&A process than the Microsoft QA process because of time and funding requirements.
- COTS User Groups:
  - Some would like military driven user groups in order to get feedback in general and in more real-time like the entertainment industry has established.
  - It was stated that the vendors need feedback from the users on their products. But, the problem is that it is not an easy process for legal reasons.

7.0 CONCLUSION AND RECOMMENDATIONS

7.1 Central Themes throughout the workshop

During the course of the workshop, several themes or "hard questions" were identified including:

- Business Models – What are the business models that governments will use to procure commercial games and technologies? What is the appropriate business model for industry?
- Workshop intent and purpose – What will the NATO nations do to exploit new technologies and commercial games that they learn about at the workshop?
- Large vs small business – What are the roles for the larger prime companies and the roles of the smaller games vendors? How do they best work together?
- Changing environment – The focus on the use or potential use of new technologies is changing, but how are the governments and industry going to adapt?

- Workshop plug-up – There is a desire for the government to see working demonstrations and a desire for industry to meet a plug-up challenge.

7.2 Conclusion

With the aim of the workshop to provide a venue to explore through demonstrations and presentations the "hard questions" related to exploiting commercial games and technology, to provide updates on the nations' current application of commercial technologies, and to provide capability briefings and demonstrations of commercial technologies with immediate potential for use in a distributed manner through VTC, virtual worlds or other means then the workshop was a success. The only objective not met was to conduct a plug-up using a common multi-national scenario. Most of the hard questions, while asked throughout the workshop, were highlighted during the open panel discussion at the end. The open panel discussion was one of the most beneficial portions of the workshop as it provided the mechanism for the participants to begin to shape the "hard questions" into manageable topics for further discussion at future workshops.

It is clear that NATO nations are currently using commercial games and technologies, and based on the remarks from the group, there is a need and a desire to continue to pursue commercial games and technology solutions even given current procurement guidelines. NATO and ACT have the organizational infrastructure to facilitate these types of workshops and should continue them.

7.3 Recommendations

- For future Exploiting Commercial Gaming and Technology for Military Use workshops, analyze the outcomes / unanswered issues from this workshop to shape the agenda and presentations of the next workshop.
- Continue to sponsor and conduct the Exploiting Commercial Gaming and Technology for Military Use workshops as it provides an enterprise view of new games and technology as well as individual nation's applications of them. Using workshops in this manner facilitate NATO and ACT's role in standards, interoperability, and best practices as well as highlighting new technologies.
- Use the NATO Research and Technology Organization to cast a wider net for participation amongst the countries not represented at the workshop.
- Develop a deliberate plan to conduct a plug-up of the latest commercial games and technologies within the NATO M&S roadmap to offer opportunities to innovative companies while providing valuable information to national representatives.
- Develop a mechanism to involve academia into the agenda for future workshops. Numerous academic institutions are developing new and innovative technologies and techniques and should be included in a public / private workshop such as MSG-078.
- Continue to be an example in the application of new technologies by offering a distributed, collaborative means to participate in the conference from remote locations.